

**Water Resources
&
Water Quality**

**Improving Regional Self-Sustainability through Forest Management within the
Sierra Nevada Mountain Range**

Delta Plan Recommendations

Offices of John S. Mills
August 23, 2012

The Delta Plan

The staff draft Delta Plan addresses most aspects of the relationship between water resources and the beneficial uses of water for the Delta satisfactorily. However, there are two aspects to the Plan that may warrant the inclusion of additional recommendations. These aspects relate to the Delta Stewardship Council's role as the leader among agencies and the coordinator of agencies dedicated to improve the health and sustainability of the Delta and its ecosystem.

The existing focus on water quantity (using flows as a metric) and water quality (using a number of specific metrics) in the Draft Plan is needed and given the time and resources available the Plan does, for the most part, lay out the necessary logic, narrative and recommendations and policies.

However, it is apparent through a careful reading of the draft Plan that a key element, the role of landscapes, especially within the foothill and mountainous Sierra watersheds, was overlooked. This oversight was probably a result of an intense focus on the Delta, and resources in the Delta, and did not "zoom out" to include those out-of-Delta resources that influence the Delta. For example, on page 207 of the Draft Plan (lines 11 & 12) the text reads, *"Water quality in the Delta is influenced by many factors. Seasonal rainfall, snow runoff, and reservoir releases..."* While partially correct please note that the text, or for that matter the entirety of the Plan, fails to address the subject of the landscape influence on the amount and quality of water issuing forth from the Delta watersheds to support the Delta ecosystem.

Given the role of the Stewardship Council in improving the health of the Delta ecosystem and water supply reliability, presumably in a complimentary fashion, the matter of improved water availability and water quality from the Sierra watersheds is even more important.

That the management of landscapes for agricultural purposes and urban development influence runoff, groundwater recharge and water quality, is not in question. However, the Plan fails to recognize the role of upstream watersheds and forests having a similar role. Indeed, the influence of resources management within that context is not even mentioned in what should be a visionary Plan.

The facts support the proposition that the Delta Plan should include adequate reference to and recommendations regarding the role of upland Sierra forest management on influencing the ecosystem and improving those conditions.

Sierra Forests

California has a Mediterranean climate with wet winters and dry summers. The Delta watersheds in the mountains to the east of the Delta are the location where much of the precipitation occurs as both rain and snowfall. Much of that precipitation leaves the coniferous forests as evapotranspiration due to supplies of subsurface water and temperatures that allow growth year round. Historically, Sierra Nevada forests were populated by tall conifers, within a low forest density. The Sierra Nevada contains the watersheds of 24 major rivers with the majority of the runoff draining into the Delta.

Under pre-European settlement conditions fires and other disturbance events regularly burned off portions of the forest and created openings in the forest canopy. Those openings then passed through continuous stages of succession over time. This important factor, the successional stages of a forest through time is very important for plants and animals that use those differing stages of a forest for habitat. During the past 100 years, human influence increasingly prioritized which resource was used and which was more regulated. The suppression of wildfires became a primary objective for federal, state, local and private resource managers. That single management dictate has significantly altered what now stands as a west slope Sierra Nevada forest.

Recent research¹ has concluded that, *"...upstream management of Sierra Nevada forests can significantly increase the value of downstream water resources by shifting water towards higher value uses and optimizing the timing of runoff. Forest thinning to reduce vegetation and thus evapotranspiration will result in a higher fraction of precipitation, particularly snowmelt, leaving the mountain forests as runoff."*

This same research notes that, *"...current forest densities are much higher than historical values. Forest thinning can also influence the timing of snowmelt and runoff. First-order estimates based on average climate suggest that by reducing forest cover by 40% maximum levels across a watershed could increase water yields by about 9%. Sustained, extensive treatments in dense Sierra Nevada forests could increase water yield by up to 16%."*

One of the few ways California can mitigate for the negative influences of climate change on total water yield and storage (man-made and natural) is through changes to the forest vegetation. Functionally, trees move water up from the soil to the atmosphere, reducing surface flow and downstream water availability. Approximately 70% of total Sierra precipitation is currently evapotranspired by native vegetation. This is generally due to conditions of an overly dense forest stand that results in a higher proportion of snow pack in tree canopies rather than on the forest floor. During winter months a

¹ Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project, Roger C. Bales, John J. Battles, Yihsu Chen, Martha H. Conklin, Eric Hoist, Kevin L. O'Hara, Phillip Saksa and William Stewart, Sierra Nevada Research Institute, U.C. Merced, Center for Forestry, U.C. Berkeley and Environmental Defense Fund, November 29, 2011

portion of the snow caught in the thick, vegetative branches evaporates or sublimates and reenters the atmosphere without ever melting and becoming part of California's water resources. In short, the weather pattern provides precipitation, but California's forest conditions repulse the water back into the atmosphere and its beneficial uses are lost to the State.

By changing the forest condition back into a more natural, pre-European condition, the result would mean a healthier more sustainable forest with greater resistance to wildfire as well as one that produced a greater yield of water for California.

Needed Direction

It is important that as the Council works towards improving the Delta and its ecosystem condition, that not all attention is focused on man-made infrastructure, regulations and the Delta. There must also be a component that examines this proposition: a drop of water only becomes a water of the State of California when it falls from the sky and impacts with the landscape below. It is imperative, that the Council dedicate some of its attention to the task of "improving regional self-sustainability" by improving the total water available and improving the water quality for all beneficial uses.

This will require "outside the Delta thinking" and of examining the potential for taking landscape level actions in partnership with federal, state and local agencies, as well as private landholders, to improve the conditions in the forest and watershed of the Delta to ultimately improve the downstream conditions.

The Delta Plan should include recommendations to further research the potential to improve the management of our federal, state and private forested lands with the express purpose of improving conditions complimentary to the coequal goals of the Delta program as provided by statute.

This work should be carried out using funding from various sources and continuing the work being carried out by U.C. Merced and U.C. Berkeley. The next logical step in that research is implementing and evaluating pilot programs within the Sierras.

The need for such bold action has never been greater. With a new norm of longer and more catastrophic fire seasons, the Delta watershed is in peril.

Proposed Plan Recommendations

WQ R-13 With the goal of improving regional self-sustainability, evaluate the potential for improved water quality metrics, including temperature and timing of flow, by modification of forest management and meadow restoration projects within the Sierra Nevada Mountain range.

The Council should coordinate their efforts with the working group of researchers from U.C. Merced, U.C. Berkeley, and Environmental Defense to continue research into the benefits of forest management to improve water quality. This work should also be coordinated with other ongoing programs within the Sierras such as the National Fish and Wildlife Foundation, the United States Forest Service, the California Natural

Resources Agency, IRWM Programs and local non-governmental organizations that have demonstrated a history of success in this subject area.

The Council should convene a working group composed of representatives of key resource managers including local governments and agencies active in this research and receive recommendations for further actions as needed. Where possible partnerships between the Council and other parties should be facilitated to maximize the use of fiscal resources and share in research.

WR R16 With the goal of improving regional self-sustainability, evaluate the potential for improved water yield through modification of forest management and meadow restoration projects within the Sierra Nevada Mountain range.

The Council should coordinate their efforts with the working group of researchers from U.C. Merced, U.C. Berkeley, and Environmental Defense to continue research into the benefits of forest management to improve water quality. This work should also be coordinated with other ongoing programs within the Sierras such as the National Fish and Wildlife Foundation, the United States Forest Service, the California Natural Resources Agency, IRWM Programs and local non-governmental organizations that have demonstrated a history of success in this subject area.

The Council should convene a working group composed of representatives of key resource managers including local governments and agencies active in this research and receive recommendations for further actions as needed. Where possible partnerships between the Council and other parties should be facilitated to maximize the use of fiscal resources and share in research.

End